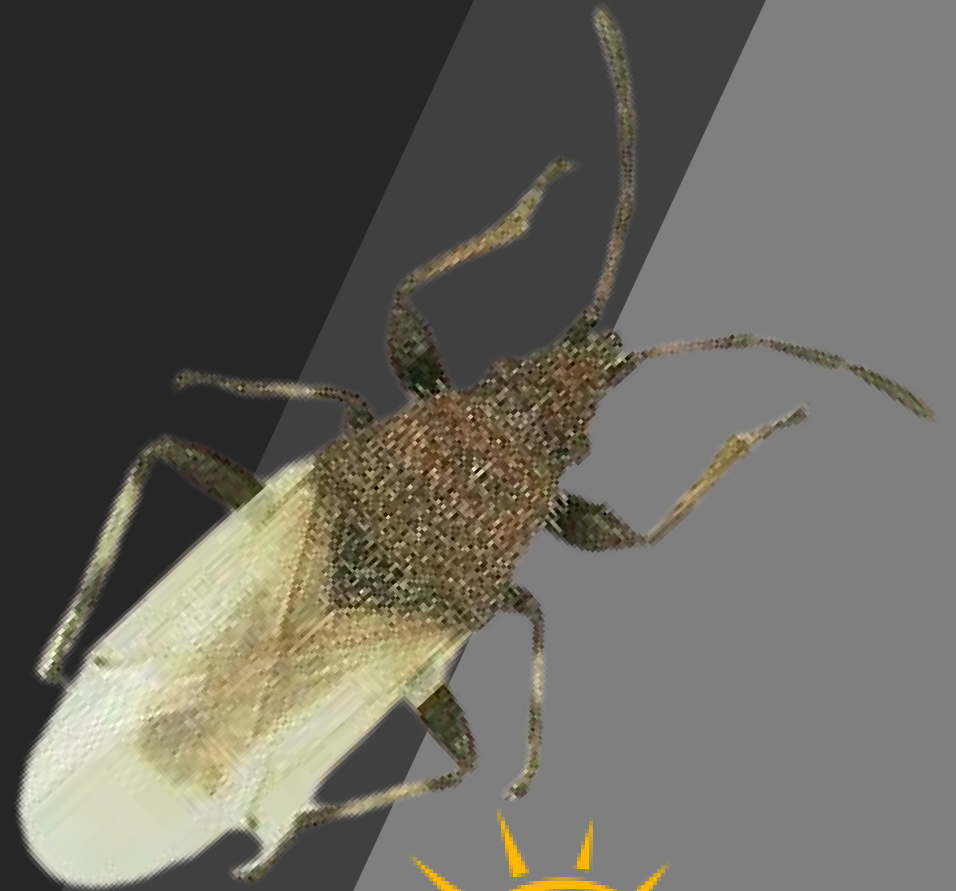


CDFA ACTIVITIES IN RESPONSE TO COTTON SEED BUG



CALIFORNIA DEPARTMENT OF
FOOD AND AGRICULTURE

OVERVIEW

- The Basics – Taxonomy, Biology, and Impact
- Known Global Distribution & Prior U.S. Introductions and Reports
- CDFA Timeline – Detections, Responses, Activities
- Limitations with Survey and Control Concepts
- Partners and Strategic Concepts Moving Forward
- Questions / Discussion

COTTON SEED BUG TAXONOMY, BIOLOGY, & IMPACT

Class Insecta (Insects)

→ Order Hemiptera (True Bugs, Cicadas, Hoppers, Aphids and Allies)

→ Suborder Heteroptera (True Bugs)

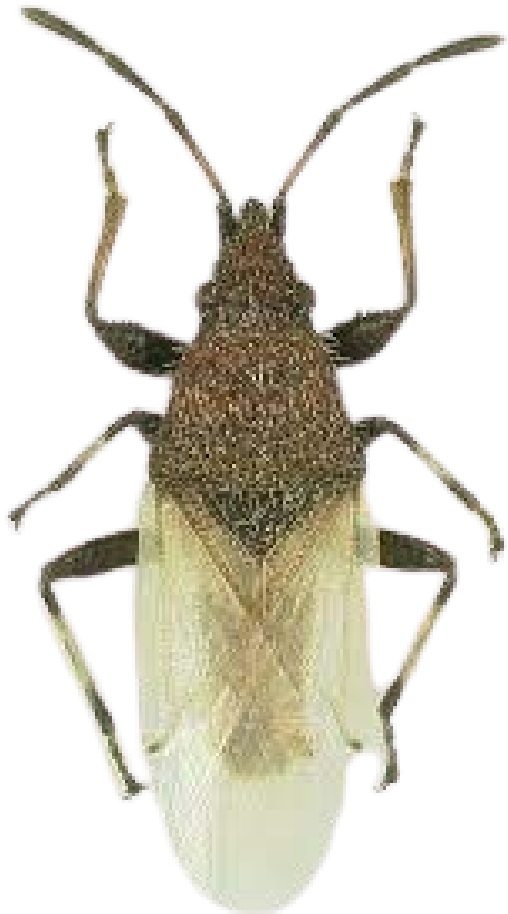
→ Infraorder Pentatomomorpha

→ Superfamily Lygaeoidea

→ Family Oxycarenidae

→ Genus *Oxycarenus*

→ Species *hyalinipennis*



55 Described
Species



O. lavaterae

COTTON SEED BUG TAXONOMY, BIOLOGY, & IMPACT

- CSB is a small (~4 mm in length), brownish-black, nondescript bug.
- There are numerous look-alikes in related families of Lygaeoidea.
- CSB exhibits incomplete metamorphosis, with 5 nymphal instars.
- The species is multivoltine, having multiple generations per year. A single generation may be as little as 20 days.
- CSB is reported to feed preferentially on at least nine Malvaceae genera, including *Gossypium*, *Hibiscus*, *Malva*, *Abutilon* and others.
- Agricultural malvaceous hosts include cotton, okra, and kenaf.
- Seeds of host plants are fed upon by adults and nymphs.



COTTON SEED BUG TAXONOMY, BIOLOGY, & IMPACT

- Adult feeding, mating, and egg laying occur when seeds of host plants are available. Feeding and egg laying do not occur on unopened bolls/pods, but they may be present on the plant. Oil quality and seed germination impacted.
- Heavily infested cotton bolls may be stained during the harvesting and processing.
- *Oxycarenus hyalinipennis* has also been reported to feed on dodder and some tree fruits, including: apricot, peaches, and grapes. Grapes and tree fruits are not reported to be reproductive hosts.
- According to Henry (1983), damage to these fruits appeared as greasy spots (from feeding) exuding gum and the presence of feces.



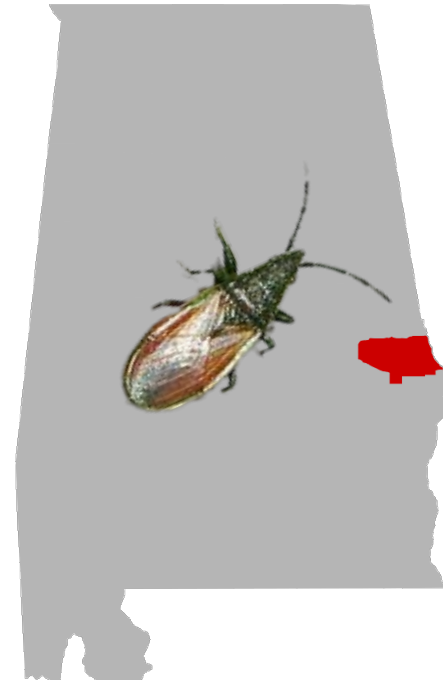
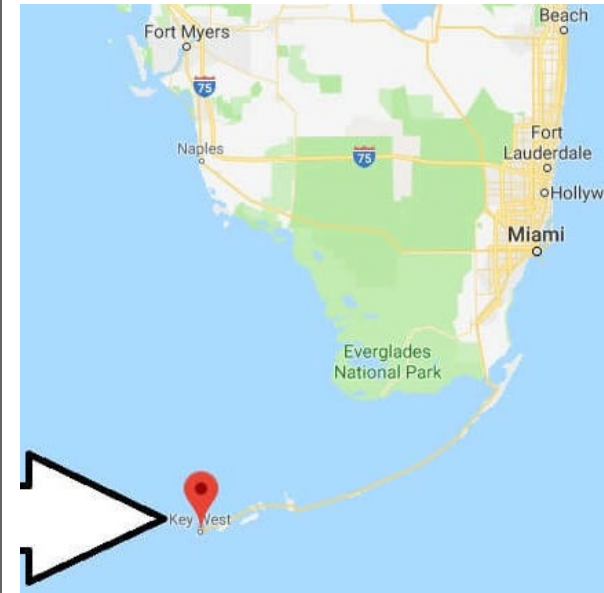


GLOBAL DISTRIBUTION

CSB is widely distributed and known to occur in Africa, Asia, Europe, South America, and the Caribbean.

PRIOR U.S. INTRODUCTIONS & REPORTS OF *OXYCARENUS*

- CSB is broadly distributed in the Caribbean, including the Bahamas, which are ~70 miles from the coast of the Continental United States, as well as Cuba which is ~100 miles from the U.S.
- In Florida, CSB was found in 2010 in the Lower Keys on Stock Island and Key West and was declared eradicated in 2014 (USDA-APHIS-PPQ, 2014).
- There is a purported collection of another related pest species of *Oxycarenus* (*O. lavaterae*) from Auburn, AL in 2015.
(Bugguide -<https://bugguide.net/node/view/1182914/bgpape>)
- Other iNaturalist observations (UT, TX, IL, CT).



CDFA – CSB TIMELINE (2019)



- Initial report and sample were submitted by a resident to the Los Angeles County Agricultural Commissioner from an *Abutilon* sp. (mallow) plant in an alleyway in a western Los Angeles neighborhood.
- An official sample was collected by LACAC/CDFA and confirmed by CDFA/USDA, and the plant was collected and destroyed by LACAC.
- The activities presented on the next slide were conducted by LACAC/CDFA within 1 mi / countywide / and nearest production cotton (100+ mi).



CDFA – CSB TIMELINE (2019)



- Los Angeles county okra grower inspections (negative)
- Los Angeles (L.A. County) nursery inspections (negative)
- Los Angeles (L.A. County) other site inspections (negative)
- Culver City (L.A. County) nursery inspections (negative)
- Culver City (L.A. County) other site inspections (negative)
- W. Los Angeles (L.A. County) nursery inspections (negative)
- Imperial County cotton boll inspections (negative)
- Kern County cotton boll inspections (negative)
- BugGuide report in Orange County follow-up (negative)

CDFA – CSB TIMELINE (2020-2021)



- Initial report from Irvine in Orange County was from city employees that were notified by a resident of a public nuisance tree (*Lagunaria* tree) shedding irritating fibers.
- The city workers, observed insects in a tree, and submitted a sample to Orange County AC. The sample was ID'd as CSB by CDFA and confirmed by USDA.
- CDFA's primary state entomologist did an online search on multiple venues (iNaturalist, BugGuide, etc.) and determined additional purported detections that CDFA followed up on as well.
- The activities presented on the next slide were conducted by CDFA and County Ag. Commissioners in response to those reports.



CDFA – CSB TIMELINE (2020-2021)



- Imperial and Kern County Cotton Boll Inspections (negative)
- Irvine (Orange Co.) Nursery Inspections (negative)
- Tustin (Orange Co.) Nursery Inspections (negative)
- Fullerton (Orange Co.) Nursery Inspections (negative)
- Long Beach (L.A. County) Nursery Inspections (negative)
- CSB Production Cotton Statewide Survey [2021]
- Summary Totals – (Imperial, Kern, **Los Angeles, Orange, Riverside, San Bernardino, San Diego**)

Official Detections

13

Negative Survey Sites

113

CDFA – CSB TIMELINE (2021)

Statewide Cotton Seed Bug Survey in Production Cotton

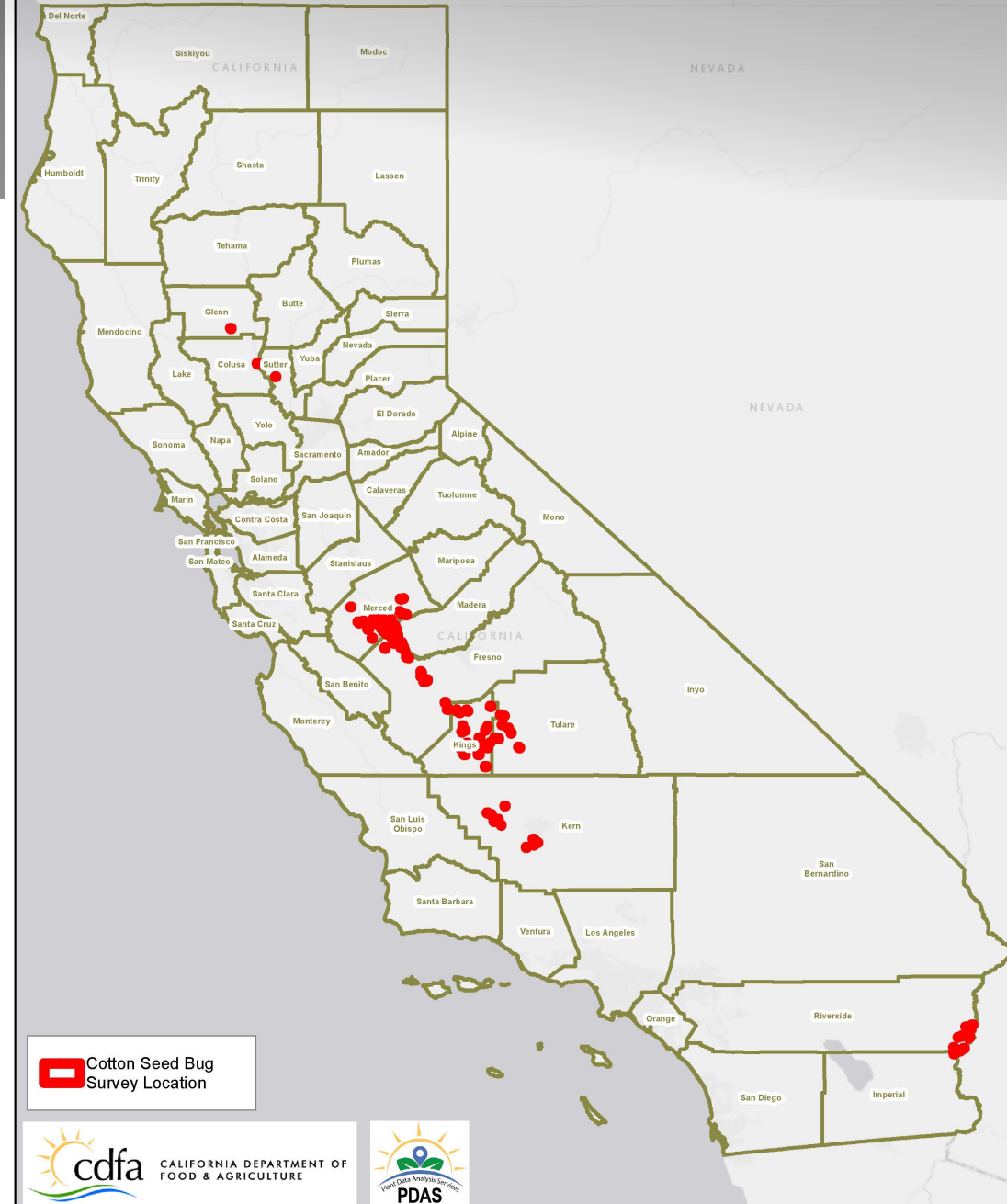
- Red dots are confirmed finds from 2019-Present
- All existing confirmed finds are in urban areas
- No known finds in commercial cotton
- Several additional reports from citizen scientists - not confirmed and not shown
- No timeline from USDA for a pheromone lure
- The finds have no known connections and no likely source of introduction





CDFA – CSB TIMELINE (2021)

2021 Cotton Seed Bug Survey



Statewide Cotton Seed Bug Survey in Production Cotton (Cont.)

- Funding derived from California Cotton Board.
- Designated sample field sites constitute 10% of cotton acreage in each county.
- Visual survey (only approved method) completed, a small # of cotton bolls collected from each sample field site
- Each field surveyed visually by walking perimeter.
- For each 20 acres, 5 bolls will be sampled from one plant per side (N,S,E,W).
- Collected bolls double bagged, labelled, and sent to Plant Pest Diagnostics Center for CSB identification.
- In addition to boll sampling, any suspect adults will be collected and placed in vials.

CDFA – CSB ADDITIONAL INFORMATION

Select Ongoing Inspection & Survey Efforts

- Grower funded silverleaf whitefly survey – production cotton (San Joaquin Valley)
- Grower funded pink bollworm and boll weevil trapping – production cotton statewide (11 counties)
- Cotton plow-down enforced annually
- Glassy Winged Sharp-Shooter (GWSS) nursery surveys (6 full counties in southern CA, and 5 partial counties)
- Annual inspections of production nurseries, and enforcement of nursery cleanliness standards (statewide)



Plants with Confirmed CSB Detections In California

- | | |
|---|---|
| ➤ Blue Hibiscus - <i>Alyogyne huegelii</i> | Undetermined Hibiscus - <i>Hibiscus</i> sp. |
| ➤ Island Mallow - <i>Lavatera assurgentiflora</i> | Undetermined Mallow - <i>Malva</i> sp. |
| ➤ Primrose tree - <i>Lagunaria patersonii</i> | Undetermined Abutilon - <i>Abutilon</i> sp. |
| ➤ Palmer mallow - <i>Abutilon palmeri</i> | Undetermined "Malvaceae" - no scientific name |

SURVEY AND CONTROL LIMITATIONS FOR CSB



Minute, drab-colored body – cryptic coloration, difficult to detect visually, look-a-likes

No specific lure or attractant – visual survey only for detection and delimitation

Obscure, reclusive natural history – life stages / generations can be present in obscurity

Resilient, compressed body – the insect can persist in cracks and crevices; hitchhiker

Physiological tolerance to adverse env. conditions – evolved in extreme fluctuations of temperature and humidity



PARTNERS AND STRATEGIC CONCEPTS MOVING FORWARD



-
- REGULATORY OPTIONS – FOCUSED INTENSIVE INSPECTIONS
 - SURVEY/DETECTION ALTERNATIVES – LURE DEV.
 - OUTREACH/TRAINING OPPORTUNITIES AND COOPERATION



QUESTIONS & DISCUSSION